

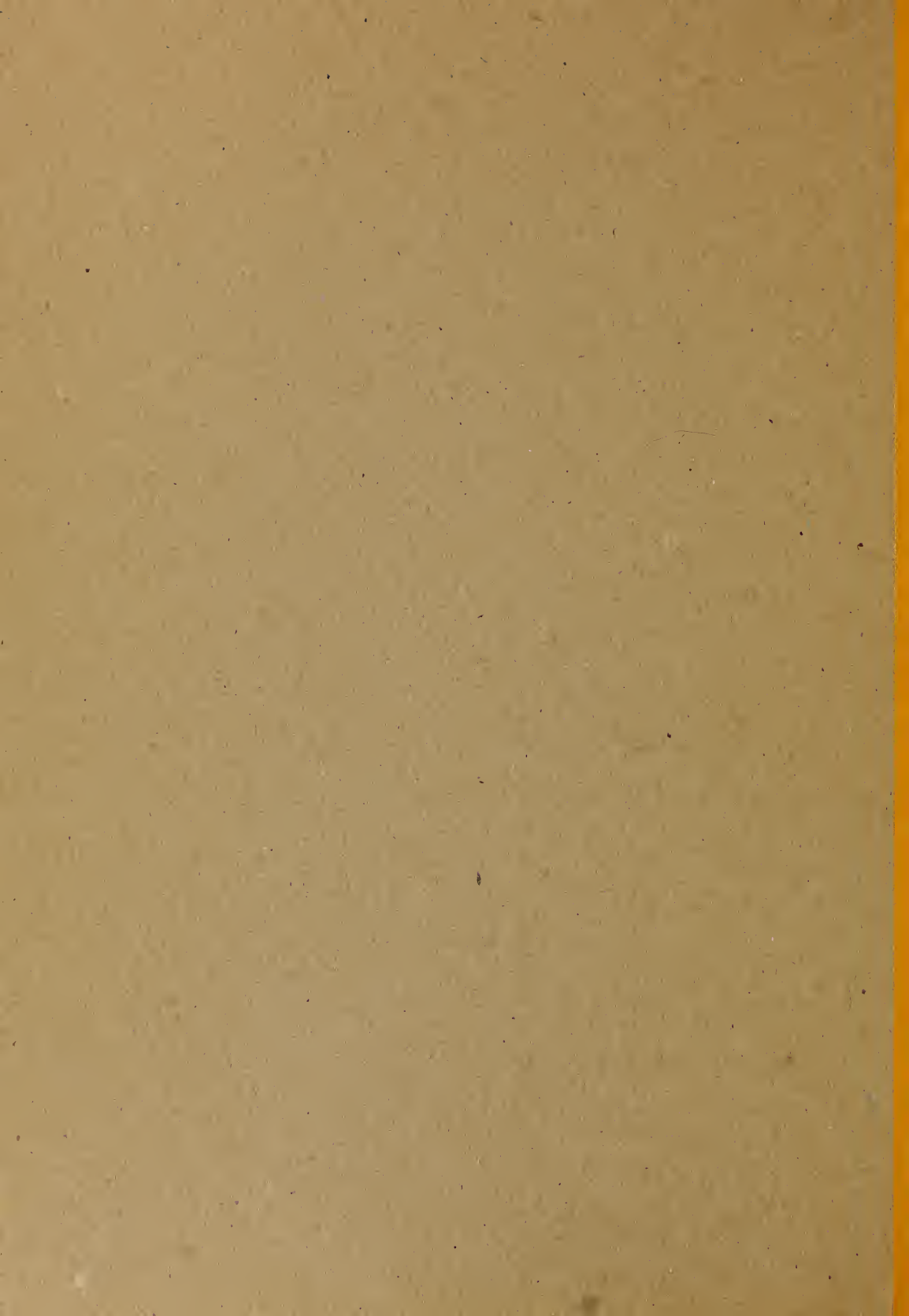
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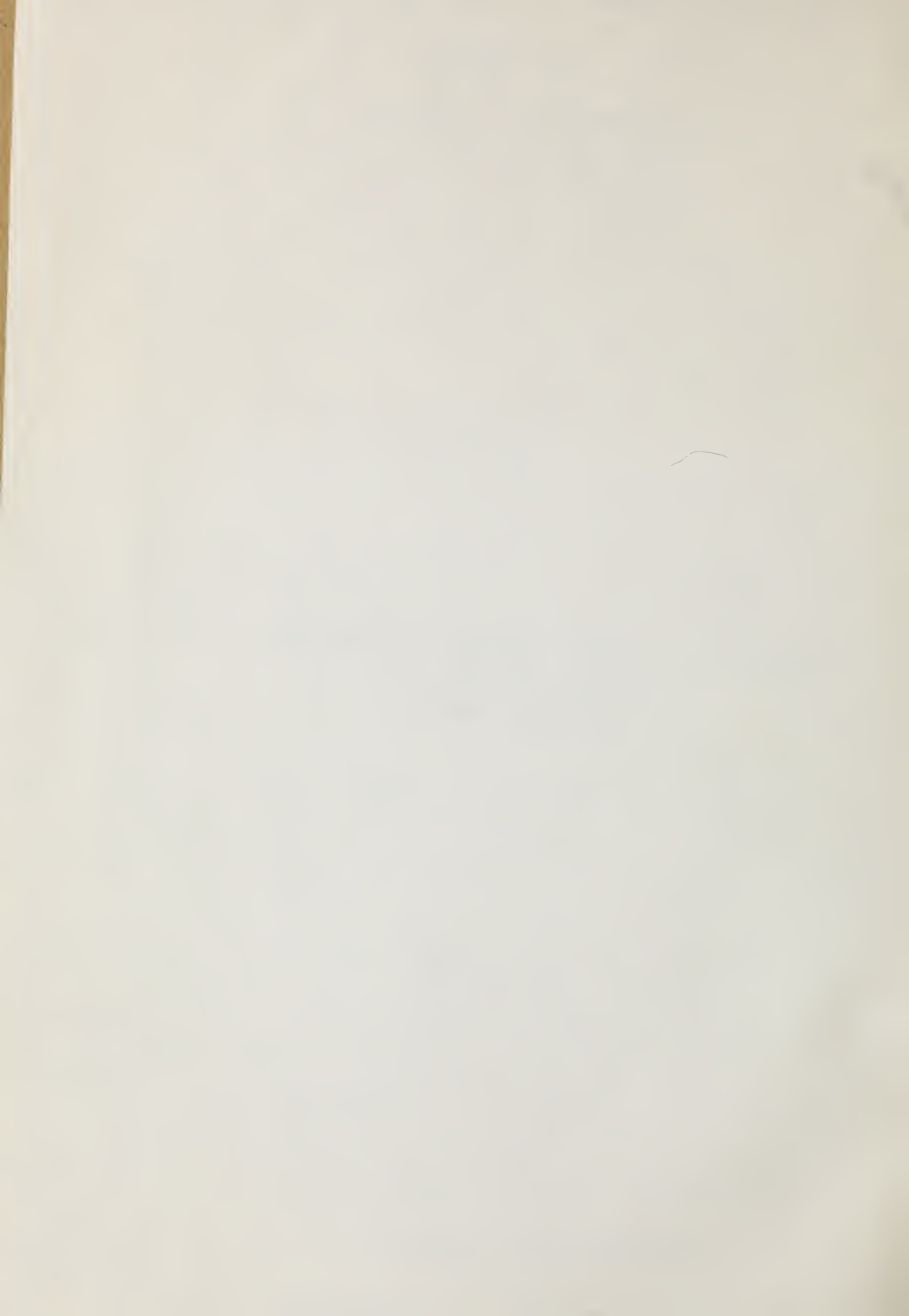


Junior High School
CURRICULUM GUIDE

UNIVERSITY OF ALBERTA
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INDUSTRIAL ARTS GRADES VII-VIII-IX
(Interim Edition)
September, 1954

Province of Alberta
Department of Education.



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SECTION A

SPECIFIC FUNCTIONS OF THE JUNIOR HIGH SCHOOL

The following is an excerpt from the Junior High School Program of Studies Handbook 1952.

"The specific functions of the junior high school are as follows:

1. To continue the training of the elementary school in basic skills and knowledge.
2. To help blend the understandings, attitudes, skills, and interests of the pupils into wholesome, well-integrated behavior.
3. To stimulate in the pupils a broadening of cultural, social, civic, and recreational interests.
4. To provide the pupil with opportunities to discover and develop special interests and abilities which may have future educational or vocational value.
5. To supply pupils with information regarding educational and vocational opportunities.
6. To stimulate in the pupils an increased interest and concern regarding personal and community health.
7. To assist pupils in making satisfactory mental, emotional, social and spiritual adjustments in their growth toward wholesome, well-balanced personalities.
8. To provide differentiated educational facilities suited to varying interests, needs, and abilities, so that each pupil may develop to the best advantage his own possibilities and capacities.
9. To assist pupils in understanding, and participating in the democratic functions of the school and the community.
10. To provide a gradual transition from the elementary school to an educational program suited to the needs and interests of high school students."

OBJECTIVES OF THE ALBERTA INDUSTRIAL ARTS PROGRAM

Attitudes

The experiences encountered in the Industrial Arts courses should tend to develop the following:

1. Co-operation - marked by consideration for the rights of others and willingness to contribute towards group experience.
2. Creativeness - marked by personal expression.
3. Scientific viewpoint - marked by the power to investigate problems, search for data, form conclusions and evaluate one's own judgment.
4. Social concern - marked by earnest effort to contribute towards desirable group ends.
5. Responsibility - marked by a sense of personal responsibility in carrying tasks to completion, and the acceptance of the consequences of one's own actions.
6. Self-respect - marked by personal control and cheerful compliance with measures designed to inculcate good character traits.
7. Reverence - marked by a conviction of Deity and a regard for His supreme handiwork - mankind.

Appreciations

Experiences should seek to emphasize the following:

1. The dignity and worth of the individual.
2. The dignity of honest labor, the significance of good craftsmanship and the value of honest effort involved in the development of such craftsmanship.
3. The importance of scientific and industrial developments.
4. The rich heritage of the Industrial Arts, marked by a general knowledge of the media used, the part they have played in the development of civilization and their contribution to the industrial, commercial and cultural life of today.

5. The significance of industrial developments as they affect our environment.
6. The opportunities provided through Industrial Arts experiences for creative expression.

Understandings

Experiences should assist the student to understand that:

1. The qualities of materials govern their suitability for specific purposes.
2. Methods of processing raw materials determine their usefulness for certain jobs.
3. Certain tools are designed to be used for specific purposes.
4. Organized thinking, careful planning and precise workmanship are necessary for good craftsmanship.
5. "Safety Precautions" are necessary in order to protect the individual and the group.

Skills and Abilities

Experiences should develop the skill to:

1. Read and interpret drawings and blueprints.
2. Use drafting equipment.
3. Produce accurate plans, marked by good design.
4. Use with increasing proficiency the more common tools and machines employed in the modifying and handling of materials.
5. Make the computations and measurements essential to the planning and construction of projects.
6. Interpret and carry out technical instructions.
7. Condition the more common tools.

NOTE: To be effective, the program should lead the student to the point where he is enabled to transfer the skills and knowledge acquired to practical situations outside the classroom.

SECTION B

PROGRAM ORGANIZATION

In this bulletin the junior high school industrial arts course has been written in twelve units as follows:

A. CONSTANT

<u>UNIT</u>	<u>PHASE</u>	<u>GRADE</u>	<u>TIME</u>
1	Drafting	VII	8 weeks
2	Drafting	VIII	8 "
3	Drafting	IX	8 "
4	Woodwork	VII	16 "
5	Woodwork	VIII	16 "
7	Metalwork	VII	16 "

B. ELECTIVE

<u>UNIT</u>	<u>PHASE</u>	<u>GRADE</u>	<u>TIME</u>
6	Woodwork	IX	16 weeks
8	Metalwork	VIII or IX	8 or 16 "
9	Electricity	IX	8 or 16 "
10	Plastics	VIII or IX	8 or 16 "
11	Leather	VIII or IX	8 or 16 "
12	Art Metal	VIII or IX	8 or 16 "

THE 3 YEAR PROGRAM

	GRADE VII	GRADE VIII	GRADE IX
8 weeks	DRAFTING UNIT 1	DRAFTING UNIT 2	DRAFTING UNIT 3
16 weeks	WOODWORK UNIT 4	WOODWORK UNIT 5	OPTION B
16 weeks	METALWORK UNIT 7	OPTION A	

OPTION A may be METALWORK UNIT 8 or 16 weeks

or

PLASTICS UNIT 10 for 16 weeks

or

ART METAL UNIT 12 for 16 weeks

or

LEATHER UNIT 11 for 16 weeks

or

A Combination of any two of these phases
for 8 weeks each.

OPTION B may be a 32 week combination selected from:

WOODWORK UNIT 6 for 8 or 16 weeks

METALWORK UNIT 8 for 8 or 16 weeks

ELECTRICITY UNIT 9 for 8 or 16 weeks

PLASTICS UNIT 10 for 8 or 16 weeks

LEATHER UNIT 11 for 8 or 16 weeks

ART METAL UNIT 12 for 8 or 16 weeks

Selection of Optional Units

The instructor in selecting the optional phases will necessarily be guided by many factors such as accommodation, equipment, students' best interests, local conditions, instructor's qualifications, etc.

He should also bear in mind the desirability of developing a program for his center which will ensure some breadth of offering. This should not be taken to the extreme situation in which little is done very thoroughly or satisfactorily in any phase. This will require the best judgement of each instructor.

A basic objective of industrial arts in the junior high school is to interpret industrial occupations and the products of industry.

A Typical Program

Grade VII	- Drafting Unit 1	- 8 weeks
	Woodwork Unit 4	- 16 weeks
	Metalwork Unit 7	- 16 weeks
Grade VIII	- Drafting Unit 2	- 8 weeks
	Woodwork Unit 5	- 16 weeks
	Plastics Unit 10	- 8 weeks
	Art Metal Unit 12	- 8 weeks

Grade IX	-	Drafting Unit 3	-	8 weeks
		Woodwork Unit 6	-	16 weeks
		Electricity Unit 9	-	8 weeks
		Leather Unit II	-	8 weeks

Such a program offers woodwork and drafting as major phases. It gives strong emphasis to metalwork and offers some experience in electricity, plastics, and leather.

NOTE:

Record your program in the shop. This will ensure continuity and indicate to students and others the scope of your industrial arts program.

SECTION C

GENERAL INFORMATION

Time Allocation

The recommended minimum time allocation is

FOUR PERIODS PER WEEK

In centers where this desirable minimum amount of time is not available, provision should be made in the course organization to offer fewer phases. Similarly where all grades do not receive instruction an attempt should be made to cover the constant units before selecting elective phases.

All classes are required to continue until the regular class closing date of the school year.

The suggested time allotted to the units (either 8 or 16 weeks) is based on a 40 week school year. Since this is not always realized in practice, adjustments must be made locally to suit the time available.

Instructor's Records

Every instructor should keep the following records:

- (a) Enrolment and attendance.
- (b) Record of theory taught, and tests administered.
- (c) Record of student achievement, including project marks and test marks.
- (e) Inventory of shop equipment.

With regard to the instructor's records it is recommended that these be simple and efficient so that a minimum of time is required to maintain them. Many instructors find that one hard-backed notebook will suffice for all purposes excepting the inventory.

Student's Records

Every student must be required to maintain a notebook which should be considered and evaluated as a project. It is essential that such a book be checked frequently for English usage, spelling, punctuation, etc. This is the opportunity for the shop instructor to make a realistic contribution to the school program in English. The instructor must insist that errors noted are corrected by the students.

A student's notebook should contain:

- (a) Notes on theory learned. These should be prepared by the student and not dictated by the instructor.
- (b) Projects, drawings, plans of procedure and bills of materials showing calculation of costs.
- (c) Pictures and articles pertinent to the various phases.

Size Of Classes

Courses and accommodation are prepared on the basis of maximum class size of twenty students. When class sizes exceed this number the Principal must be advised of the difficulties experienced with inadequate accommodation and/or equipment.

Where classes are double-programmed it is recommended that the enrolment not exceed fifteen students.

The shop instructor has direct responsibility to the Principal for efficient operation of the classes.

Standards

In any value judgments as to course organization, project selection, project marking, etc. the emphasis must be on QUALITY RATHER THAN QUANTITY.

Instructors are responsible for ensuring that individual students are achieving at capacity or near capacity.

No project should leave the shop which does not reflect favorably on the instruction, and in which the student may not justifiably have a feeling of pride and successful accomplishment.

Evaluation Of Student's Achievement

This is a matter in which it is most difficult to be objective. However, the following is suggested as a fair proportion of the factors which should be considered in the evaluation of a student's success in an industrial arts course:

JOB	60%	(includes project work, test marks, group work, etc.)
ATTITUDE	20%	(an evaluation of the degree in which the attitudes and appreciations have been achieved).
ACHIEVEMENT. . .	20%	(an evaluation of skills and abilities).

Shop Accommodation And Equipment

There are many situations insofar as accommodation is concerned. However, the recommended accommodation has, among others, the following major features:

1. Is located as a wing of the school, or close to the school.
2. Is at grade level with an 8 or 10 foot overhead door.
3. Has a minimum ceiling height of 12 feet.
4. Has an area of 2000 square feet; rectangular in shape, in approximate proportion of 1:2.
5. Makes provision for finishing room, storage room and planning area.
6. Has a wood or tile floor in wood section, concrete floor in the metal section.
7. Has a master electrical control panel for power outlets, within easy access of the instructor.

Centers planning new construction should prepare a floor layout and consult with the Provincial Supervisor of Industrial Arts, Department of Education, before plans are accepted.

Every suitable industrial arts shop has three essential areas: woodworking, metalworking and planning. There will, of course, be some overlapping of these but the nature of the program makes provision of these areas necessary.

The planning area may be a table with drafting equipment and library books available. Although industrial arts is essentially characterized by activity some research and planning should be done by students throughout the year.

Open faced tool panel boards are recommended. Tools must be readily available to all students for maximum efficiency. Only tools in good condition should be available, others awaiting repairs or conditioning should be in storage.

Machines must be adequately guarded, properly installed and in approved working condition, or removed to storage.

Shop Maintenance

The shop environment for an effective program must be neat, tidy and well organized. This is an essential feature of a program which intends to develop desirable habits and attitudes and interpret industry.

A unique instructional duty of the industrial arts teacher is that he must allocate a portion of each day to shop and tool maintenance. Where this is done conscientiously the school administration is prone to allocate time or make allowance insofar as extracurricular duties are concerned so that time is available.

Shop Clean-Up Routine

There is no uniform policy concerning organization of the shop clean-up routine. Some instructors have a rather detailed revolving duties routine; others have a fixed personnel with duties system; others act as foreman and assign duties on the spot.

Instructors must make their own decision as to the system which contributes most to their program and yet is democratic.

Irrespective of the system used it is essential that there be some effective system. Every class coming into the shop is entitled to find everything in good order. A motto for every shop is:

A PLACE FOR EVERYTHING
AND EVERYTHING IN PLACE

General Shop Procedure

Although the ideal and desirable situation is the one in which instruction may be given in one phase to the class as a group there are situations in which this is not feasible.

Each shop should be organized and equipped so that the constant phases may be handled on a class group basis. It is reasonable and advantageous to double-program the optional units when offered on the 8 week basis; e.g., Art Metal Unit 12 and Plastics Unit 10 both offered for 8 weeks each may well be offered simultaneously. There are obvious advantages insofar as equipment, project ideas and breadth of experience for students are concerned. The use of General Shop Procedure demands unique techniques and instructional methods.

The Project Method

Achieving educational aims through projects is a unique contribution of industrial arts to educational methodology. Since the project is the medium through which the teacher works, the selection and evaluation of these is of prime importance.

Usually beginning students have had no experience upon which to base individual choice of projects and it is, therefore, advisable that the instructor select a class project which will facilitate uniformity of instruction in basic and fundamental skills and knowledge. Later as the class has developed some planning and construction ability, a selection from a group of projects all belonging to a type is made. It is necessary that a group of students select the same project so that the class as a whole may be organized into groups for instruction. As the class gains experience and ability the eventual step is to individual choice of project. This eventual stage provides the widest possible challenge to the student's creative activity.

On completion of the Project, it must be graded. The following factors should receive careful consideration:

1. Design
2. Accuracy in following plan
3. General construction
4. Finish

More important than building the project, however, is the overall development of the boy himself. His total effort should be recognized:

1. Has he developed good attitudes?
2. Does he co-operate willingly?
3. Has he shown initiative?
4. Is he developing good work habits?

The environment in which the boy works and learns has a definite bearing on the individual. Is the shop well planned? Is it clean and tidy? Is there a place for everything and is everything in its place? The boy should take a place in the shop and he should be a part of its definite and precise organization.

Use Of Phase Analysis Charts

Many instructors find that the time spent on preparing a check-off sheet for use by each class is useful. Such a sheet lists the students in a column on the left and selects some fifteen or so major skills along the top; e.g., in Grade VII woodwork these might be: make a bill of material; use a rip saw; adjust a plane; bore a hole; make a butt joint; etc. When the student can demonstrate a reasonable mastery of the item he is either checked off or marked. Such a chart should be readily available to the students (e.g. mounted on tackboard). Competition whets interest, enthusiasm and is a useful motivation device when used reasonably.

School Closing

At the end of the school year the instructor must ensure that:

1. The inventory is checked and reported to the Principal or Secretary-Treasurer.
2. The student's accounts are audited by a responsible authority, usually the Principal.

3. The tools are sharpened and parts needed as repairs ordered.
4. The tools are either oiled or waxed and put in secure location.
5. The shop is thoroughly cleaned and left in creditable condition.
6. Materials required for at least first phases, usually drafting and wood, are ordered.

The obvious purpose of all this is to ensure a "flying start" in September. One of the easiest ways to develop poor habits on the part of all concerned is to be unprepared for school opening. Teaching students how to "kill time" is not a legitimate objective of industrial arts.

Girls

The industrial arts course is a suitable and desirable exploratory course for girls. If it is possible for the girls to be grouped together the elective phases of leather, plastics and art metal should be emphasized.

Other Phases

There are other legitimate phases of industrial arts work, viz: Radio, Graphic Arts, Automotive, Ceramics, Textile, Home Mechanics, which are not suggested in this bulletin. Instructors wishing to offer optional units in any of these phases may do so. They are asked to request approval from the Provincial Supervisor of Industrial Arts, Department of Education for these innovations.

Standard Reference

Every instructor should have the America Vocational Association booklet "A GUIDE TO IMPROVING INSTRUCTION IN INDUSTRIAL ARTS", published in 1953 and available from the American Vocational Association, 1010 Vermont Ave., N.W. Washington 5, D.C. (\$1.00 per copy).

This is a revision of their previous "IMPROVING INSTRUCTION IN INDUSTRIAL ARTS 1948".

SECTION D

THE SHOP SAFETY PROGRAM

The shop must have an effective safety program. A major objective of our program is the development in each pupil of desirable attitudes and practices with respect to health and safety. The shop instructor has an exceptional opportunity to make a real contribution to the development of the student in this respect. The habits, attitudes and skills developed in the shop have implications in the home and the community.

The following are suggested features of a good shop safety program:

1. Frequent mention of health and accident hazards found in the community, home and school life of the pupil. Discussion should result in remedial action.
2. The use of safety films.
3. A stress on safe operation of tools and machines. This should be a development of reasoning as to cause and effect and not be an enumeration of DON'TS. Checking and repetition of instruction is necessary to ensure that correct habits are formed from the beginning.
4. Attention to correct and approved personal habits, clothing and safety devices. The instructor sets a most effective example in this respect. A clean smock is part of the professional equipment.
5. Discussion of fire precautions and action to be taken in case of fire.
6. First-Aid equipment which is readily available. The instructor should be up-to-date as to First-Aid procedures.
7. Posters effectively displayed. Such posters are available from:
 - (a) The Workman's Compensation Board. Provincial Govt.
 - (b) Education Department, Atlas Press Company, Kalamazoo, Michigan.
 - (c) Stanley Tool Company.
 - (d) May be made by students in correlation with their art.

8. Use of safety slogans such as:

- (a) "Long Sleeves are Fine But not at Shop Time".
- (b) "A Careful Man is the Best Safety Device Known".

These should be readily visible in the shop and mentioned periodically.

- 9. A student safety organization. Often this is the detailing of students to check for safety violations. The intention is always to develop a safety-conscious group of students.
- 10. A well organized shop with adequate working space about machines, non-slip mats at machines, floor lines, dynamic color painting of machines and equipment, etc.

NOTE:

Accidents must be promptly reported to some senior school authority. If no other person is designated, this authority is the Principal.

SECTION E

DRAFTING

Man learned to sketch and draw thousands of years before he learned to write; in fact his first letters were developed from simplified drawings. Today sketching ranks next to writing for the purpose of conveying ideas from one person to another, and it is much superior to writing when the idea or information to be conveyed is of a technical nature.

Drafting is the universal language of the industrial world. It is the means by which ideas and information concerning the manufacture, construction or erection of objects of all kinds are recorded and given to others. It is important, therefore, that students should have some understanding and appreciation of this important language. The purpose of this phase of the course is to help the student gain some understanding and skill in the basic principles and processes of the language of industry.

The draftsman, like the carpenter, has his own kit of tools and speaks his own special language. Learning to use these tools accurately and well and to speak the draftsman's language is one of the major tasks facing the beginner in learning to draw the draftsman's way.

Suggested Approach

It is suggested that twenty drawing boards, each about 12" by 19", can be made from a 4' by 8' sheet of plywood and edged with hardwood to facilitate the action of the T square. Tempered masonite also makes a suitable surface.

Since thumb tacks have been superseded by masking tape or drafting clips, for pinning down paper, softwoods are no longer a necessity in drawing boards.

Two grades of pencils, a 3 or 4 H pencil for construction and light lines and an H pencil for finish and heavier line work, are sufficient for Junior High School work.

The following sizes are suggested as suitable for Junior High School drawing equipment:

Drawing board12" to 18" by 18" to 24"
T Square20" to 24" in length
45° set square6" or 7"
30° - 60° set square . . . 8" to 10" in length

It is recommended that American Standards be adopted as the official authority for drafting practices in Alberta and that single stroke, vertical, Gothic numerals and upper case letters only be used throughout the Junior High School courses in drafting.

The following points cannot be overemphasized in all grades of drafting in the Junior High School:

1. Untidy or careless work should not be tolerated.
2. Poor plates should be corrected or repeated.

Instruments and instrument care should be studied as the instruments are introduced or demonstrated to the various grades.

In the section on Program Organization it is indicated that eight weeks should be devoted to drafting. This should not be interpreted as meaning eight consecutive half-day sessions. Shorter sessions extended over a longer period have been proven to have greater educational value. In most grades a portion of each shop day in the first three or four months should be devoted to drafting with the remainder being devoted to woodwork.

Moreover, students should be encouraged to continue to do drafting throughout the year as required in their project work. A project well and thoroughly done is of educational value. The drawing, either making or reading, is of consequence in each project.

UNIT ONE: DRAFTING FOR GRADE VII

A constant unit. Eight weeks or equivalent time.

It is suggested that very little formal drawing be done in Grade VII but that an over-all emphasis be placed on sketching and planning until the pupil acquires some of the major concepts of technical drawing.

It should be kept in mind that student interest must be caught and held throughout the whole course. This can perhaps be best accomplished through the meaningful drawing of actual objects or projects which may be built later in the course.

The need for an accurate plan for any project should be stressed at all times.

Keep the emphasis on clean, neat and accurate work at all times.

Specific Objectives

1. To teach the student the fundamental importance of drafting as the "universal language" of industry.
2. To teach the student enough about drafting and blueprint reading to enable him to follow simple plans from which to make projects.
3. To teach the student to have an appreciation for clean and accurate work.

Grade VII Pupils Should Learn

1. The names and uses of the following drafting instruments:
 - (a) Drawing board.
 - (b) T Square
 - (c) 45 Set Square
 - (d) 30-60 Set Square
2. How to care for instruments.
3. How to fasten paper to a drawing board.

4. How to make erasures.
5. How to lay out a small drawing sheet.
6. How to keep a drawing clean.
7. The relationship between views in orthographic drawing.
8. How to center views on a sheet.
9. How to "pencil in" a drawing in proper order.
10. How to dimension a simple drawing.
11. How to make an attractive strip or box title.
12. How to print neatly.
13. The names and uses of the following conventional lines:
 - (a) Border lines
 - (b) Construction lines
 - (c) Outline lines (visible lines)
 - (d) Hidden lines (invisible lines)
 - (d) Dimension lines
 - (f) Extension lines

Suggested Plates for Grade VII

1. Put a border and strip title on a sheet and line it in for printing.
2. Print in plate I with single stroke, vertical, upper case Gothic lettering and numerals.
3. Four equal rectangles, evenly spaced on a sheet, one to be lined in with horizontal lines, one with vertical lines and two with oblique lines.
4. A three view orthographic drawing of a simple shape description block. This to be dimensioned and completed.
OR
5. A drawing of a simple project (wood or metal) which might be used as an exercise or project later.

Suggested Approach

At Grade VII level many students do not seem able to learn the use of instruments and at the same time follow the concept of orthographic drawing.

It is a good plan to introduce the letters in groups; e.g., straight stroke letters, combined straight stroke and curved stroke letters, then complete curved letters.

No instruments are used at first. Free hand sketching on plain or squared paper will allow many simple projections to be made from blocks of various shapes until the concept of projections is familiar.

The concept of views on planes can be shown by the use of a simple cardboard or screen view box.

Once the theory of drawing is grasped, instruments may be introduced.

References

See reference list at the end of Unit III.

UNIT TWO: DRAFTING FOR GRADE VIII

A constant unit. Eight weeks or equivalent time.

In Grade VIII the emphasis swings from freehand sketching to formal drawing, though sketching is not to be abandoned as a medium for the transfer of ideas and the grasping of the isometric concept.

Specific Objectives

1. To review the concept of orthographic drawing and apply it to more difficult drawings.
2. To make a more serious attempt to improve on the quality of printing and line work.
3. To introduce isometric projection.

Grade VIII Pupils Should Learn

1. By review what was covered in Grade VII.
2. The names and uses of those instruments:
 - (a) Compasses
 - (b) Dividers
3. How to dimension circles and arcs as needed.
4. How to center and layout an isometric drawing.
5. How to draw an isometric view.
6. To use instruments with greater facility.
7. To do the following geometric constructions (only as the need arises):
 - (a) Divide a line into any number of equal parts
 - (b) Construct a hexagon
 - (c) Construct an octagon
 - (d) Draw an ellipse

Suggested Plates for Grade VIII

1. A plate of printing, (quality rather than quantity).
2. A dimensioned three view orthographic drawing.
3. A drawing of a shop project in orthographic.
4. A drawing of a shop project in isometric.

Suggested Approach

It is suggested that a definite attempt be made to improve the quality of printing and the execution of line work, while still maintaining the emphasis on clean, neat, accurate work.

Three views of orthographic drawing are now combined in one drawing showing their proper relationship one to the other. The result drawing resembles a perspective drawing in some respects but not in others and is known as Isometric Projection.

References

See reference list at the end of Unit III, Grade IX.

UNIT THREE: DRAFTING FOR GRADE IX

A constant unit. Eight weeks or equivalent time.

In Grade IX the emphasis is maintained on formal drawing and the student should display considerable facility in the interpretation of orthographic and isometric drawings.

The Grade IX student should be introduced to simple surface development as used in sheet metal layouts.

Specific Objectives

1. To review the work taken in Grades VII and VIII.
2. To have students apply what they have learned in previous grades to the planning of their projects.
3. To introduce surface development.

Grade IX Pupils Should Learn

1. By review what was covered in Grades VII and VIII.
2. To do neat, accurate, uniform printing.
3. To do neat, accurate drawing.
4. To use instruments with ready facility.
5. To make and use a center line.
6. To use the architect's scale (if available).
7. To do the following as need arises:
 - (a) Sectioning
 - (b) Make and use break lines
 - (c) Use cutting planes and lines

Suggested Plates for Grade IX

1. A plate of printing if any weakness in printing is evident.
2. A drawing of a project that may be made in shop.

3. An Orthographic drawing done in Isometric.

OR

An Isometric projection done in Orthographic.

4. A simple surface development as used in sheet metal.

Suggested Approach.

The blueprinting of superior drawing offers a great incentive to careful drawing. If facilities for blueprinting are available pupils may build up a library of shop blueprints for class use as well as make copies of their own drawings.

Emphasis must be maintained on neatness and accuracy as in previous grades. There is a tendency for standards to be dropped in this grade if the instructor is not vigilant.

If possible establish the concept of orthographic projection as the right angle projection of an object as compared to the multiview projections which may be at any convenient angle.

BIBLIOGRAPHY FOR DRAFTING

AN ANALYSIS OF DRAFTING FOR TEACHERS. Boston. D.C. Heath and Company.

This book contains excellent outline material in a readily available form.

* Cobough: SHOP DRAWING FOR BEGINNERS.

Coover, Schriver L.: DRAWING, SKETCHING AND BLUEPRINT READING. Toronto. McGraw Hill Company.

An excellent book on all phases of drafting for a teacher's reference. It contains problems and projects with numerous detailed drawings of all phases of drafting.

* Diamond, Thomas, A.: A PRIMER OF BLUEPRINT READING.

* Ermeling, Fischer and Greene: MECHANICAL DRAWING. First year.

Fryklund and Kepler: GENERAL DRAFTING. Bloomington, Illinois. McKnight and McKnight Publishing Company.

This book covers all the basic elements of drafting but does not go into multiview projection or the more recent "explored" views found in larger books.

Giesecke, Mitchell and Spencer: TECHNICAL DRAWING. The MacMillan Publishing Company.

An excellent book on all phases of drafting, very thorough and quite technical. It contains all the American Standards though it departs from them at times itself.

* Schaeffer, Glenn, N.: BASIC MECHANICAL DRAWING.

*These four books are very good for providing reading and interpretation practice in mechanical drawing as they consist of drawings with questions pertinent to them to be answered by the student.

WOODWORK

The novelty of woodwork in Grade VII provides a vital motivating force which is valuable to the instructor in directing student progress along desirable lines. Instructors should be careful not to kill this interest by over-stressing theory, exercises and perfection. Use projects as much as possible as a teaching device. Power tools should not be introduced until students have become acquainted with hand tools. Students should understand these machines thoroughly before being allowed to use them. Safety in the use of these power tools cannot be overstressed. As the students progress through woodwork in Grades VIII and IX a higher degree of accuracy, speed and broader knowledge of materials should be demanded of them.

Specific Objectives

1. To develop a knowledge and appreciation of woods and related materials used within the shop and their adaptability to projects.
2. To teach the importance of careful planning and orderly procedure in solving woodworking problems.
3. To develop a working knowledge of woodworking tools and machines.
4. To develop an appreciation of good design and construction.
5. To develop a working knowledge of wood finishes.
6. To provide experiences which may lead to the development of woodworking hobbies.
7. To develop safe habits in the use of woodworking tools and equipment.

UNIT FOUR: WOODWORK GRADE VII

A constant unit. Sixteen weeks or equivalent.

The following indicates the minimum basic skills and knowledge which are considered suitable for this age group:

TOOLS AND OPERATIONS

1. Make out a bill of material.

2. Read a working drawing.

3. Checking material.

4. Using the Vise.

5. Crosscut and Ripsaws.

6. Using the Jack Plane.

7. Measuring with a Rule.

TEACHING UNITS

Units of measurement: board feet, square feet, and lineal feet.
Cost of materials.

Be able to interpret correctly simple drawings and sketches.

Learn to avoid waste, to be critical of material and to appreciate accuracy in measurement and layout.

Care of the vise. Methods of holding stock in the vise.

Characteristics of the two saws. When each is used. Method of holding. Starting the cut. Sawing to rough sizes. Position and stroke in sawing. Safety precautions.

Working knowledge of parts. Assembly and adjustment. Holding plane and proper stance for planing, the stroke and pressure during the stroke. Care of the plane. Students should be required to plane a surface, smooth, plane an edge, plane end grain and chamfer.

Position of the rule when measuring. Exercise in reading and measuring. Care of the rule. Dividing equal spaces.

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| 8. Using the Try Square. | Names of parts. Methods of holding. Use in scoring a line. Testing for squareness. |
| 9. Using the Benchhook. | Position on the bench. Method of holding work for backsawing. |
| 10. Back Sawing. | Identifying the saw. Type of teeth. Method of holding. Safety. (Clamping squared block to line might be used to aid student in making a square, accurate cut.) |
| 11. Filing Curved Surfaces. | Different types of files. Method of holding, direction of stroke. Care of files. Safety. <u>Note</u> : Do not use to excess or to replace other tools. |
| 12. Sawing with Coping Saw and Fret Saw. | Use of the saw. How to hold. Type of strokes. Tightening the blade. Replacing blades. Speed of saw. Position of saw in relation to work. Use of jigs. |
| 13. Nailing parts together. | Identifying brads, finish and common nails. Selection for the job. Spacing. Use of proper hammer. |
| 14. Setting with a Nail Set. | Use and proper selection. Method of holding. |
| 15. Use of the Brace. | Parts and function. Sweep. Setting bit in chuck. The ratchet. General care. How to hold and use. |
| 16. Boring with an Auger Bit. | Determining sizes. Parts and uses. Methods of holding. Method of boring vertical and horizontal holes. General care. |
| 17. Drilling for screws with Twist Drills. | Identification of twist drill. Determining sizes. Correct size for screws. |
| 18. Using the Hand Drill. | When use. Method of holding. Care. |
| 19. Countersinking for screws. | Types of countersinks. Purpose. Depth of countersink. |

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| 20. Using the Screwdriver. | Selection of size for screw.
Safety in use. |
| 21. Fastening with screws. | Selection of screws - length and size. Boring for screws - shank and pilot hole. |
| 22. Sanding. | Preparation of surface for sandpaper. Selection of sandpaper. The sanding block. Sanding with the grain. Sanding flat or curved surfaces. |
| 23. Simple wood finishing. | Preparation of surface. Proper application. Cleaning brushes and containers.
Sealers and undercoats
Putty
Paint
Oil stains
Varnish |
| 24. Making simple wood joints
e.g. Butt joint. | Uses of joints. Procedure in squaring ends. Fastening: nails, screws, glue. (Use in projects). |

Related Information

1. Lumber:
 - How it is cut, milled, dried, and delivered to market.
 - Stacking lumber.
 - Selecting of lumber for a project.
 - Forest conservation.
 - Discussion of woods in common use.
2. Nails:
 - History.
 - Modern manufacture.
 - A nail for every job.
3. Sandpaper:
 - Manufacture.
 - Kinds and uses.
 - Grits.
4. Finishing:
 - Purpose of Finishes: beauty, protection, cleanliness.
 - Discussion of Shellac, Paint and Varnish.

Power Tools (optional)

Lathe, Jigsaw, Drill Press, Sander. Stress safety and good work habits.

Suggested Projects

Book ends	Wall Brackets
Tie Racks	Door Stops
Cutting Boards	Wall Plaques
Shoe Racks	Book Shelf
Pin-up Lamps	Broom Holder
Tool Boxes	Bird House

Suggested Approach

The first project or two in Grade VII should be simple and require a limited time. Ordinarily to ensure thorough instruction these are done on an exercise basis: i.e. all students make the same article. As the course progresses the students should be encouraged to select (or design) a project from a group type e.g. bird house. However, this is not the time to allow much freedom of choice which in the early stage leads to wasted time, effort and material. The more mature student, however, may well get to the stage where his project work is on an individual choice basis.

There should be systematic instruction in the use of tools and in related knowledge.

Pupils should be encouraged to: make and read drawings; make a bill of material; calculate costs; prepare a plan of procedure.

UNIT FIVE: WOODWORK GRADE VIII

A constant unit. Sixteen weeks or equivalent.

TOOLS AND OPERATIONS

1. Use of Planes
 Jack
 Fore
 Jointer
 Block
 Smooth
2. Gauging with the Marking Gauge.
3. The Marking Knife.
4. Using the Spokeshave.
5. Use of saws.
 Crosscut
 Ripsaw
 Keyhole
6. Expansive bit.
7. Using the Dowel Jig.
8. Using the Mallet.
9. Making templates and patterns.
10. Sliding T-bevel.

TEACHING UNITS

- Parts of the plane. Student should progress to more accurate work. He should receive instruction and experience in the use of a number of types of planes. He should be able to assemble, whet, adjust, and know the intended use of each.
- Name of parts. Setting the gauge. How to hold and use the gauge. Adjustment and sharpening of the point.
- Sharpening the point. Holding the knife to score. Safety.
- Purpose of the tool. Holding and adjusting. Direction of stroke and sharpening.
- Starting the cut. Saw control. Cutting angle. Safety.
- Purpose of the bit. Setting for size. How to prevent splitting.
- Purpose. Fastening on prepared work. Use.
- Why it is used on wooden handled tools. Advantages.
- Method of transferring desired shape to piece for template. Advantages of templates.
- Checking angle with protractor or steel square. Holding the bevel against the work. Transferring angles.

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| 11. Using Handscrews and Clamps. | Selection of proper clamp and types of clamps. Adjustment. Gluing up. Protection of work. |
| 12. Cutting with a Mitre Box. | Placing stock in the mitre box. Type of saws used. Adjustment. |
| 13. Wood staining. | How to prepare and apply oil, water, and spirit stain. Advantages and disadvantages of each. Wiping the surfaces. Care of brushes and containers. |
| 14. Wood filling. | Reasons for using fillers. Coloring filler. Application. Rubbing off. |
| 15. Finishing - rubbed varnish. | How to apply and rub down varnish using: rottenstone, pumice stone, waterproof sandpaper, felt pads and wax. |
| 16. Joints - constructing and using various types of joints (use in projects). | Cross lap.
Mitre - with mitre box.
Edge to edge glued.
Dado - through and stopped.
Simple dowel. |
| 17. The Drill Press. | Use - speed, utility, safety and care. |
| 18. The Jig (Scroll) Saw. | Use of the scroll saw. Size of blades. Types of blades for various kinds of work. Changing blades and adjusting the machine tension, guides etc. Angle cutting. |
| 19. The Turning Lathe. | Name of parts, turning speeds. Preparation of work. Mounting work in the lathe. Use of various cutting tools. Sanding, buffing, and safety on the lathe. |
| 20. How to select and use Abrasives. | How to select and use various whetting stones, and sandpaper. Types of grit: Garnet, Flint, Emery. |

Power Tools

Those available in the Shop. Stress safety. If a circular saw is available it must be used properly guarded and under supervision.

Suggested Projects

Footstool.	Corner bracket.	File and chisel handles.
Kitchen Stool.	Book ends.	Wooden mallets.
Simple End Table.	Book shelves.	Nut bowls and candy trays.

Related Information

1. How lumber is seasoned - air and kiln.
Grading of lumber.
Defects of lumber.
Property and uses of various available kinds of lumber:
 Identification.
 Characteristics.
 Uses.
 Costs.
2. Glue - history, source, preparation, use and application, drying time.
3. Finishing materials. A study of:
 Paint - flat, semi-gloss.
 Enamel.
 Varnish - floor, spar, quick drying.
 Turpentine.
 Linseed Oil
 Methyl Hydrate.
4. Steel wool - manufacture, grading and use.
5. Pumice and rottenstone - history, source and uses.

UNIT SIX: WOODWORK GRADE IX

An elective unit. Eight or Sixteen weeks
or equivalent.

TOOLS AND OPERATIONS

TEACHING UNITS

1. The Grindstone.

Use and care of the grinding wheel.
Types of stones. Grades of stones,
and uses of each. Sharpening on the
grindstone.

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|------------------------------------|--|
| 2. Nails and Screws. | Uses and nomenclature of various nails and screws. |
| 3. Using the Wood Scraper. | How to use the cabinet and hand scrapers. How to sharpen and burnish the edge. |
| 4. How to fasten a table top. | Various methods shown. |
| 5. Drawer construction. | Discussion of good drawer construction. Method of making a drawer. Names of parts, guides, etc. |
| 6. Machine sawing. | Identification of types of saws. Care of saws. Safety. Cleaning. Use of guards and push sticks. How to make the following cuts: ripping, crosscutting, dadoing, mitering, rabbeting. |
| 7. Bandsawing. | How to use the bandsaw for ripping and crosscutting. Setting the table for angle cuts. Blade adjustment - safety. |
| 8. Wood Joints. (use in projects). | How to make the following joints. Uses, advantages and disadvantages:
Mitre.
Dowel.
Mortise and tenon.
Blind dado. |

Related Information

1. Lumber: Sizes and dimensions.
Defects of lumber and trees.
Plywood - manufacture and grading.
Grading of lumber.
Mouldings.
2. Wax: Paste and liquid.
Manufacture and uses.
3. Knowledge of good furniture construction, including design.
4. Hardware: Knowledge of various types of hinges, locks, pulls.
Sizes, how sold, types of finish, etc.

Power Tools

Drill Press.
Lathe
Jig Saw.
Band Saw.
Bench Grinder.
Bench Saw.
Jointer.

Stress safety and develop confidence by practicing correct procedures.

Suggested Projects

Furniture from plywood or solid. Turned articles including built-up bowls and lamps. Encourage originality and student choice.

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Project Books

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- Gottshall: WOODWORK FOR THE BEGINNER. Bruce Publishing Company.
- Lukowitz: FIFTY POPULAR WOODWORKING PROJECTS. Bruce Publishing Company.
- Lush: IT'S FUN TO BUILD MODERN FURNITURE. Bruce Publishing Company.

Films:

1. Text Films - - McGraw Hill - Shopwork Series - Strip Films.
 - (a) Care of Hand Tools.
 - (b) Sharpening Hand Tools.
 - (c) Auger bits and twist drills.
 - (d) Sawing, planning and smoothing wood.
2. Teach-O-Filmstrips - Produced by Popular Science Pub. Company, and distributed by the Ryerson Press.
 - (a) Safety (b) Design (c) Hardwood lumbering.
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METALWORK

Metalwork is one of the most important phases of the Industrial Arts program. Almost everything we use is either made from metal or has been made with the use of metal tools. It is important, therefore, that students learn about the metal trades and how to use some of the simple tools as part of their general education.

Specific Objectives

1. To develop skill in the use of hand metal working tools and selected machines.
2. To instill in the students the need for accuracy.
3. To develop an understanding of the characteristics of common metals.
4. To develop in the student the ability of reading and making working drawings.
5. To develop in each student the understanding of safety rules and the need for safe practices in the metal field.

UNIT SEVEN: METALWORK GRADE VII

A constant unit. Sixteen weeks or equivalent.

The following indicates the minimum basic skills and knowledge considered suitable for this grade.

TOOLS AND OPERATIONS

TEACHING UNITS

A. SHEET METAL

1. Layout:

Steel rule.

Position of rule when measuring. Exercises should be given in reading and measuring care of rule. Dividing equal spaces.

Scriber.

Care of scriber. How to hold. Use in scribing lines only.

Square.

Name of parts. Method of holding. Use in scribing a line. Testing for squareness.

Dividers.

Name of parts. Care. Use in scribing arcs and circles.

2. Cutting:

Tinner's Snips.

Care - position for holding, use in the following straight and curved lines. Notching. Types.

Files.

Care - sizes and kinds in common use. Use in draw filing edges.

Punches:

Hollow

Care and use.

Solid

Care and use.

Prick

Care and use.

Bench lever or
hand punch

Care - names of parts. Proper
method of use.

3. Fastening Devices:

Rivets.

Sizes and kinds of rivets.
Purpose of riveting. Correct
method. Use of rivet sets.

Self-tapping Screws.

Sizes. Proper method of use,
where used.

Joints.

Common joints used. Lap and
folded or grooved seams. Method
of making joints with proper
allowance.

Soldering.

Types of coppers. Correct method
of turning copper and work. Fluxes
and their purposes. Composition
of solder. Correct principles of
soldering.

4. Forming: (Equipment available only).

Slip rolls.

Name of parts; Correct use; Care.

Folder Brake.

Name of parts; Correct use; Care.

Stakes.

Proper names and correct use.

5. Templates.

Purpose and proper use..

6. Hammers:

Riveting.

Care and use.

Setting down.

Care and use.

Wood mallet.

Care and use.

B. BENCH METAL

1. Layout:

Steel rule.

As in sheet metal.

Scriber

Square

Dividers

Protractors

Marking Ink.

Use in laying out lines on metal.
Composition.

2. Cutting:

Hacksaw.

Name of parts. Correct method of holding. Correct method of using. Use of proper blade for different types of work.

Files.

Care. Sizes and kinds in common use. Correct method of filing.

Chisels.

Types. Proper use for each type. Method of holding. Care.

Drills.

Proper use. Name of parts. Use in hand or breast drill. Use in drill press under instructor's supervision. Use of drill press vice.

Countersinking.

Proper use and care of countersinks.

2. Fastening:

Rivets.

As in sheet metal.

Nuts and Bolts.

Common type and sizes. Types of head. Proper place to be used.

4. Hammer: (those available only).

Ballpein
Crosspein
Setting down
Riveting
Soft faced

Name of parts. Correct method of holding. Proper use.

5. Drill Press.

Name of parts. Method of drilling, speed and feed. Use of drill press vice. Care of drill press. Use of cutting oil.

6. Vises.

Care and use.

7. Bending and Forming.

For use in scroll work. Proper method of bending or forming with some type of jig. Type of metal that can be bent or formed. Correct method of flanging or flaring ends.

C. FINISHING

Enamel
Lacquer
Chemicals

Types and use. Either self drying or baking. Care of brushes.

Emery Cloth and Steel
Wool.

Use of each. Proper method of using. Proper time to use.

Related Information

1. Identification of common metals: iron, steel, copper, brass, aluminum, tinplate, galvanized iron, Canada plate.
2. Care, use and names of hand tools.
3. Shop safety.

Projects

Sheet Metal:

Key tag; soap dish; small tray; cake pan; cookie cutter; sugar scoop; ash tray; recipe box; bed lamp; cookie pan; cup; plate, and minor repairs.

Bench Metal:

Pancake turner; pocket wrench; calipers (inside or outside); coping saw frame; scribe; trowel; foot scraper; gate hook; screw driver; toasting fork; plant holders; lamps; wall brackets.

Suggested Approach

The approach to the above outlined operations should always be through useful projects. In order to keep the interest at a high level in metal work it is necessary to have the students make useful projects, the necessary related theory being taught when the pupil feels the need for it.

UNIT EIGHT: METALWORK GRADE VIII OR IX

An elective unit. Eight or Sixteen weeks or equivalent

TOOLS AND OPERATIONS

TEACHING UNITS

A. SHEET METAL

1. Layout:

Steel Rule.
Scriber.
Square.
Dividers.
Protractor.
Trammel points.

Review of Unit Seven.

Care - use in scribing large arcs and circles.

2. Cutting:

Tinner's snips.
Files.

Review of Unit Seven.

Punches:

Hollow.
Solid.
Prick.
Bench lever or hand punch.

Review of Unit Seven.

3. Bench Grinder.

Care and proper use. Stone dressing. Conditioning of cold chisels and punches. Use of goggles.

4. Fastening Devices:

Rivets.
Self tapping screws.
Joints.
Soldering.

Continuation of Unit Seven.

5. Forming: (using equipment available)

Slip Rolls.
Folder Brake.
Stakes.

6. Templates.

7. Hammers:

Riveting.
Setting down.
Wood mallet.

B. BENCH METAL

1. Layout:

Steel rule.
Scriber.
Marking ink.
Square.
Dividers.
Protractor.

Continuation of Unit Seven.

2. Cutting:

Hacksaw.
Files.
Chisels.
Drills.
Countersinks.

Taps and Dies

Correct names. Correct method
of use. Use of cutting oil.
Tap drill sizes.

3. Vises.

As in Unit Seven.

4. Bending and forming.

As in Unit Seven.

5. Hammers:

Ball pein.
Cross pein.
Riveting.
Soft faced.

As in Unit Seven.

C. FINISHING

Enamel.
Lacquer.
Chemicals.
Emery Cloth and Steel Wool.

D. LATHE (optional)

- | | |
|-----------------------------|---|
| 1. Oiling. | Types of oil. Purpose of oil.
Correct procedure of oiling.
Lubrications of centers. |
| 2. Turning: | |
| Chuck and between centers. | Mounting chucks and face plate.
Mounting work. Use of drill and countersink. Use of face plate and dogs. |
| Straight and taper turning. | Micrometer reading. Types of cutter bits. Offsetting tail stock for taper turning. |
| 3. Knurling. | Set up for knurling and proper procedure. |
| 4. Filing and Polishing. | Proper use of lathe files. Care of files. Correct method of polishing. |

Projects

Sheet Metal - Continuation of Unit Seven.

Bench Metal - Lamp bracket; pocket wrench; calipers; pocket square; bicycle carrier; door knocker; rivetting hammer; scroll work; ash stands; foot stools; tables.

Lathe - punches, center, drift or pin; plumb bob.

Special Note

In Unit 8 Finishing and two of Sheet Metal, Bench Metal and Lathe constitute the complete Unit (or Finishing and selected parts of other three phases).

For 8 week option Finishing and one of Sheet Metal or Bench Metal constitute the complete unit.

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UNIT NINE: ELECTRICITY GRADE IX

An optional unit. Eight or Sixteen weeks or equivalent.

The extensive and ever-increasing use of electrical energy in our modern world makes an understanding of at least the basic electrical principles of value to all. Many of our students will find their lifetime work in this trade area. Our problem then is to provide the student with experience which rightfully belong to this area AND to teach some useful basic electrical principles.

This course suggests a job approach to this phase. Instructors who prefer and have success in the project approach are encouraged to continue with this method. They, and others, will find the following suggestions of value.

In the job-centered course a basic lesson is associated with some shop practice. The basic lessons must be selected and organized in a logical sequence. Shop prepared demonstration and work-station equipment is required. Shops adopting this method will do so building up equipment over a period of years. Associated with selected project work the course has vitality and purpose.

Specific Objectives

1. To acquire knowledge of electrical principles through actual practice.
2. To develop skill and ability in the interpretation of electrical symbols and diagrams.
3. To develop self-confidence and self-reliance through actual practice with electrical apparatus.
4. To stress safety in all aspects.
5. To encourage recognition of the importance of electricity in modern living.
6. To stress neatness and accuracy in all diagrams and wiring hook-ups.

Suggested Jobs and Related Theory

Splicing Annunciator Wire.

The Simple Lighting Circuit.

Conductors and Non-Conductors.

The Simple Bell Circuit.

Bell and Two Push Button Circuit.

Two Bells and One Push Button Circuit.

Front and Back Door Bell Circuit.

Series and Parallel Circuits.

The Flash Lamp.

Testing Dry Cells.

Dry Cell Construction.

The Magnet.

The Mariner's Compass.

The Magnetic Field.

The Electromagnet.

Magnetizing and Demagnetizing.

The Electric Bell.

The Annunciator.

The Small Motor.

The Extension Cord Assembly.

Heater Cord Assembly.

Fire Alarm Circuit.

Return Call Circuit.

Door Latch Opener.

Auto Lighting Circuit.

Auto Lighter Dimmer Effect.

Electroplating.

A Simple Storage Cell.

Storage Battery Testing.

The Electrolytic Rectifier.

The Table Lamp.

Wire Splicing.

Bell Transformer.

Fuses.

Loomex Work - One Lamp.

Loomex Work - One Lamp and One Switch.

Loomex Work - Flush Switch.

Loomex Work - Convenience Outlet.

Loomex Work - Two Lights.

Loomex Work - The Three Way Switch.

Conduit Work - Light and Switch.

Metal Moulding - Light and Switch.

Flexible Conduit - Light and Switch.

Resistance Measurement.

The Electric Stove.

K.W.H. Meter.

Wire Gauging.

Three Heat Switch.

Three Wire Lighting System.

Gas Auto Engine.

Auto Distributor and Coil System.

Maintenance and Replacement of Motor Brushes.

Auto Directional Light System.

Repair or Replacement of Electric Iron Element.

Two Filament Auto Light.

Christmas Tree Lights - Parallel Circuit.

Christmas Tree Lights - Series.

Stop - Go Signal Lights - Autos.

Bicycle Light Circuits.

Solenoid Principle.

Burglar Alarm Circuit.

Telegraph Key and Sounder and Morse Code.

Crystal Set Circuit.

Principle of Induction - Generators.

The Electric "Eye" Principle.

Suggested Approach

The instructor must determine the topics suitable for his course and from the list of Suggested Jobs and Related Theory select the jobs most applicable to his course. Where necessary he will include other jobs which he considers are more suitable for the purpose.

The jobs selected should be "made-up" in the form of instruction or job sheets for use by the student (see reference texts marked with asterisk).

The class should be divided into groups. Each group will carry through the job sheets in logical order. Best results will be obtained from groups of 2 or 3 persons or from individual effort.

Over a period of two or three years the instructor should be able to accumulate sufficient equipment for each of the jobs listed without undue expense per year. A good deal of valuable equipment (motors, generators, switches, etc.) may be acquired by an enterprising instructor for very little actual cost. Some items (small sockets, push-button switches, lay-out boards, test panels, etc.) can be made as class projects.

A stock of good demonstration equipment is very desirable, and can be built up from year to year.

Evaluation of the completed jobs is essential. This may be done through immediate on-the-spot grading, or checking of the student's answers to questions on the job sheets and his summary statement. Opportunity for overall testing will occur when all students complete the work on a section of the course, e.g. following the work on circuits.

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UNIT TEN: PLASTICS GRADE VIII or IX

An elective phase. Eight or Sixteen weeks or equivalent.

In this phase we concern ourselves with the synthetic plastics. The plastic industry is one of ever increasing proportions and importance. It is known as one of the fastest growing of modern industries. Some of our students may find their lifetime occupation in this industrial area.

The ever increasing use of plastics in everyday living warrants our consideration as a legitimate area in which we should provide experiences which attempt to "interpret the products of industry" and give some initial vocational exploration.

It is a medium which can be manipulated with the wood and metal tools already available in the shop. Since the projects usually require small quantities of material the expense involved need not be a deterrent.

Specific Objectives

1. To provide some successful first experiences for the student in working with plastics.
2. To introduce the history of plastics, their kinds and their uses.
3. To adapt the habits, knowledge and skills of good workmanship as developed in other phases to this new area.
4. To continue the development of safe working habits.

Operations and Suggested Projects

There are many books and magazine articles which suggest suitable projects and the following is a suggested list to indicate the scope possible:

Book ends, cigarette dispenser, picture frame, comb case, key case, costume jewelry (earrings, brooches, necklaces, watch bands, bracelets, tie clips, etc.), powder box, salad forks, spoons, plastic animals, cracker holder, salt and pepper shakers.

The following operations should be covered (* indicates suitable for eight weeks phase):

- * 1. Layout and transferring patterns.
- * 2. Cutting (using coping saw, back saw and V Block).
- * 3. Dressing the edges (using block plane, mill file, and abrasives).
- * 4. Drilling holes.
- 5. Surface decorating.
- * 6. Fastening.
- 7. Use of dyes.

Related Theory

- * 1. An elementary treatment of the history of plastics.
- * 2. A study of the modern use of plastics.
- 3. The types of plastics.
- * 4. The use of tools and machines in working with plastics.

Tools and Equipment

All of the common tools used in woodwork and metalwork can be used in working plastics. These tools, however, must be sharp. The so-called soft plastics will dull all sharp edged tools quickly. Plastics produce an abrasive action on sharp tools that has not been explained.

The use of machine tools will increase the working possibilities of plastics. Practically all machine tools used in the wood and metal shop can be used to fabricate plastics.

Findings and Supplies

Refer to Page 150 and 151 in GENERAL PLASTICS. A list of supply companies in the U.S. and Canada which supply tools, plastics, and plastic findings may be obtained by writing the publishers of GENERAL PLASTICS.

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42nd St. New York 17, N.Y.

Rohm and Haas Company: Philadelphia, Penn.

PLEXIGLAS

PLEXIGLAS DESIGN MANUAL

PLEXIGLAS METHOD OF INSTALLATION

Bakelite Corporation: New York. THE A B C's OF MODERN
PLASTICS.

THE FABRICATION OF CATALIN.

Periodicals

The following magazines contain articles from time to time
on how to construct specific articles:

Home Craftsman.

Industrial Arts and Vocational Education.

Mechanic Illustrated.

Popular Homecraft.

Popular Mechanics.

Popular Science Monthly.

Science and Mechanics.

Special Magazines

The following magazines are for those who wish to keep up
with the new commercial developments in the plastic industry:

MODERN PLASTICS: 122 East 42nd Street, New York 17, N.Y.

PLASTICS: 342 Madison Avenue, New York 17, N.Y.

UNIT ELEVEN: LEATHER GRADE VIII or IX

An elective phase. Eight or Sixteen weeks or equivalent.

Leathercraft has been practiced by man since time immemorial. The products of the leather worker have always been held in high regard, either for their monetary or aesthetic value or both. Primitive societies in all parts of the world have shown uncommon knowledge and skills in handling this material so valuable for shelter, clothing and other uses. The students' interest will be caught up by a resume of some of these historical aspects of the craft.

There is an undeniable fascination about leatherwork either as a school shop subject or as a hobby. The many fine craft leathers delight the sense of touch and the wide variety of articles which can be turned out by even the amateur craftsman are equally appealing to the eye of all who appreciate craftsmanship. Leatherwork too has an advantage over some other crafts in that very acceptable results can be obtained without the necessity of a large outlay of money for equipment or a long course of training. The beginner's first simple project can be a very satisfactory product. This is especially important to teen-age pupils.

Leathercraft offers wonderful opportunities for artistic expression. Here in the shape and surface of a fine material may be executed designs exemplifying the basic principles thereof. There is a constant challenge to pupils with creative abilities. Manipulative skills are developed by degree as the pupil advances from the simple to the more complex procedures.

No other shop course is more adaptable to time allotments set up in the local school program. The organizing skill and discretion of the instructor would determine the degree to which the subject could be explored in the allotted time.

It is not necessary that each pupil be supplied with anything like a complete set of basic tools. However, it is most desirable that he have his own modeller. Punches, knives, awls, etc., may be shared. A carrying case or chest with hinged lid should be supplied with some orderly arrangement for storing the tools, fittings, etc.

Specific Objectives

1. To provide some successful first experiences in working with leather.
2. To teach some of the history and development of the leather craft.
3. To apply the principles of good design to a new medium.
4. To develop pride in accomplishment as a result of orderly, efficient and complete performance of a job.
5. To teach the student to identify, and use the common tools and materials used.
6. To provide an opportunity for the expression of originality and individual initiative.
7. To continue to develop accepted and safe working habits.

Operations

1. Design or otherwise prepare patterns.
2. Layout patterns on skin or hide.
3. Cut Leather.
4. Prepare leather for tooling.
5. Transfer designs to leather.
6. Do outline tooling.
7. Set eyelets.
8. Do background stippling.
9. Do modelling.
10. Skive leather.
11. Use leather punches - revolving, solid, slit.
12. Set snap fasteners.
13. Cement project parts and linings.
14. Edge lacing - at least three types such as whip stitch, *single buttonhole, *double buttonhole.
15. Splice lacing.
- *16. Color lacing - dye, inks, chemicals.
17. Clean leather.
- *18. Apply durable finishes to leather.
- *19. Use stamps.
- *20. Simple braiding of thonging.

*Recommended for 16 week course only.

Suggested Projects

1. Elementary:

Bookmark	Memo Pad Cover
Car Key Case	Coin Purse
Baggage Tag and strap	Wrist Watch Strap
Comb Case	Needle and Thread Case
Keytainer	Novelty Jewelry

2. Advanced:

Wallet	Book Ends
Belt	Album Covers
Book Cover	Picture Frame
Camera Case	Cribbage Board Case
Playing Card Case	Example of Braiding
Knife Sheath	Slippers
Lighter Case	Bridle
Desk Set	Hand Bag

Related Information

History of Leathercraft:

In Ancient Times
In Medieval Times
In American Indian Communities
In Modern Times

The Manufacture of Leathers:

Preparation
Tanning
Currying
Finishing

Types of Leathers in Common Use:

Animals from which the following leathers are obtained:
cowhide, calfskin, goatskin, pigskin, reptile skin, horse-
hide, sheepskin, suede.

Identification and uses of the above listed leathers.

Skins and hides differentiated.

Modern imitation leathers.

Calculation of sizes - whole skins, sides, half skins,
square feet. Prices, etc.

Leathercraft Tools:

Construction Tools - such as knives, punches, etc.
Decorating Tools - such as modellers, stamps, etc.

Other Materials and Accessories:

Sewing materials, hardware fittings for wallets, bags
keycases, etc.

Teaching Suggestions

1. The teacher should supervise very closely any leather cutting by beginners.
2. Safety precautions should be observed by pupils in handling knives as keenly sharp as necessary for leatherwork.
3. For skiving a safety razor provides a perfect tool.
4. Imitation leathers and plastic lacings should be avoided as much as possible. Leatherwork should be work with leather.
5. Girls should be encouraged to join the leatherwork class, if possible.
6. Related theory should be coincidental to shop work after the introductions have been made.
7. A few pages of well kept notes and mounted designs and layouts could be reasonably expected.
8. Expensive projects should be discouraged.
9. Designs which are easily understood are generally basically sound.
10. As a general rule backgrounds should comprise from one-quarter to one-third of the total surface area.
11. It is wise to keep originals, working from tracing and having a background shaded.
12. Natural or Russet leathers are most satisfactory for beginners as tracing lines are easily seen.
13. The use of Russet Goatskin for smaller projects is highly recommended as it responds beautifully.
14. On class projects, the use of perhaps no more than two different designs permits closer supervision.

15. Very satisfactory spoon tracers may be made from used dental picks.
16. Stamps may be made by filing mild round and square steel.
17. Doodle pages are highly instructive and may be obtained from Hobby Shops.

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UNIT TWELVE: ART METAL GRADE VIII or IX

An elective phase. Eight or Sixteen weeks.

One of the most fascinating phases of Metalwork is the making of beautifully designed articles often from the non-ferrous metals. The design is of the utmost importance. This phase of the work allows great scope for individual effort. The suggested outline indicates the breadth of work possible, the instructor must make a judicious selection.

Specific Objectives

1. To provide some successful experiences, particularly non-ferrous metal.
2. To apply the principles of good design to metal.
3. To teach the student to identify, spell correctly and use the tools and materials peculiar to the phase.
4. To provide an opportunity for the expression of originality and individual initiative.
5. To provide an opportunity for each student to realize the joy of pride in well planned and successful accomplishment.
6. To continue to develop habits of good workmanship.

Suggested Projects and Operations

All projects involve: planning and reading plans; reading and following instructions; application of principles of good design; planning procedure; and the application of safe and proper working methods. The instructor to make a selection from:

1. Band iron scroll type projects involving:

Making full sized pattern.
Cutting stock.
Flaring ends.
Bending and shaping using jigs, and perhaps twisting.
Riveting or otherwise joining.
Finishing: planishing, buffing and/or painting, etc.

2. Tapped plaque type projects: wall plaques, book ends, book covers, etc. involving:

Making tapping tools.
Cutting lock.
Transferring design.
Stippling.
Finishing: cleaning, polishing, lacquering, etc.

3. Foil plaque type projects: wall plaques, lamp bases, box tops, etc. using No. 32 to 36 gauge non-ferrous metals and involving:

Tracing design.
Cutting stock.
Outlining.
Modeling.
Finishing.

Girls in the class often find the use of metallic foil of interest and value. Lapel pins, earrings, etc. are suggested as projects.

4. Tray type projects: ash trays, trays, shallow dishes, etc., involving:

Layout.
Cutting metal (particularly discs).
Use of forming block and forming hammer.
Annealing.
Trimming, filing and shaping edge.
Finishing: pickling, planishing, polishing, coloring, preserving.

5. Bowl Type Projects: bowls involving:

- Layout.
- Cutting discs.
- Use of raising block and raising hammers.
- Annealing.
- Filing and decorating edges.
- Finishing: pickling, planishing, polishing, coloring, preserving.

6. Etched type projects: paper knives, newsplates, decoration of bowls, trays, etc. involving:

- Pickling.
- Transfer of design.
- Use of Resist.
- Cleaning, polishing and preserving.

7. Pierced type projects: paper knives, plaques, numbers, stencils, etc. involving:

- Layout.
- Drilling holes.
- Use of jeweler's saw.
- Filing.
- Finishing.

8. Wire Work: shaped wire object involving:

- Cutting.
- Twisting.
- Bending.
- Finishing.

9. Spinning: (where equipment is available). Usually plates involving:

- Layout.
- Cutting discs.
- Mounting.
- Spinning.
- Annealing.
- Wiring.
- Finishing.

10. Other: involving hard soldering and usually involving making of personal jewelry. For well advanced students only.

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